

**Written Testimony of  
William H. Gates  
Chairman, Microsoft Corporation**

**Before the  
Committee on Health, Education, Labor and Pensions  
United States Senate**

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Chairman Kennedy, Ranking Member Enzi, honorable members of the Committee, my name is Bill Gates and I am Chairman of Microsoft Corporation. I am also a co-chair, with my wife Melinda, of the Bill & Melinda Gates Foundation. It is an honor for me to appear before you today to share my thoughts on the future of American education, the development of our workforce, and other policies necessary to ensure America's continued competitiveness in the global economy.

Any discussion of competitiveness in the 21st century must, in my view, begin by recognizing the central role of technology and innovation. Having spent the last 30 years as the head of one of the world's leading software companies, I am continually astounded at the tremendous potential for technology to improve people's lives. My faith that technology can help transform lives has only been strengthened through my work with the Gates Foundation, which focuses on funding innovative solutions in health care and education in order to reduce inequities in the United States and around the world.

When it comes to innovation, America has a great deal of which to be proud. Many of the greatest advances in computing originated in America's research labs, public and private. These technologies have helped America achieve unprecedented gains in productivity and real wage growth.<sup>1</sup> American companies are global leaders in producing innovative pharmaceuticals, and our biotechnology industry is the envy of the world.<sup>2</sup>

In these and other areas – energy, transportation, telecommunications, financial services, manufacturing, agriculture, and many others – the achievements borne of American ingenuity and inventiveness have fueled unprecedented prosperity and improved the lives of people everywhere. America will need every ounce of this ingenuity as it confronts

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<sup>1</sup> For a recent report on the impact of information technology innovations on U.S. productivity and economic growth, see Robert D. Atkinson & Andrew S. McKay, The Information Technology & Innovation Foundation, *Digital Prosperity: Understanding the Economic Benefits of the Information Technology Revolution*, Jan. 2007.

<sup>2</sup> I witness the impact of these innovations every day in my work with the Gates Foundation. The Foundation is working with dozens of leading research institutions and biotechnology and pharmaceutical companies, many located in the United States, to develop innovative vaccines for HIV, malaria, and a host of other developing world illnesses. More information about the Gates Foundation's work on global health issues is available on its website: <http://www.gatesfoundation.org/GlobalHealth>.

the challenges of this century: climate change, energy independence, national security, rising health care costs for an aging population, and the emergence of new innovative economies in Asia and elsewhere.

When I reflect on the state of American competitiveness today, my immediate feeling is not only one of pride, but also of deep anxiety. Too often, we as a society are sacrificing the long-term good of our country in the interests of short-term gain. Too often, we lack the political will to take the steps necessary to ensure that America remains a technology and innovation leader. In too many areas, we are content to live off the investments that previous generations made for us – in education, in health care, in basic scientific research – but are unwilling to invest equal energy and resources into building on this legacy to ensure that America’s future is as bright and prosperous as its present.

America simply cannot continue along this course. We must invest now to secure our economic and technological leadership for the future. In my view, we will lose this leadership unless we take three important steps:

- First, we must ensure that America’s students and workers have the skills necessary to compete in a digital economy by providing them with the necessary educational opportunities and resources. A top priority must be to reverse our dismal high school graduation rates – with a target of doubling the number of young people who graduate from high school ready for college, career, and life – and to place a major emphasis on encouraging careers in math and science. We must also focus far more of our energies on upgrading the skills of Americans already in the workforce.
- Second, we need to attract and retain the brightest, most talented people from around the world. This will not happen until we reform our immigration policies for highly skilled workers. America should be doing all it can to attract the world’s best and brightest. Instead, we are shutting them out and discouraging those already here from staying and contributing to our economic prosperity.
- Third, we need to provide a foundation for innovation by investing in ideas and capturing their value. The public sector in particular needs to continue to increase investments in R&D, especially in basic scientific research, to complement the R&D of the private sector and address new challenges. The R&D tax credit, which provides a critical, proven incentive for companies to increase their investment in U.S.-based research and development, needs to be made permanent. We also need a legal framework that rewards innovation.

## **I. Providing 21st Century Educational & Training Opportunities**

America cannot maintain its innovation leadership if it does not educate world-class innovators and train its workforce to use innovations effectively. Unfortunately,

available data suggest that we are failing to do so – in our math and science programs, in our job training programs, and especially in our high schools.

A. Improving America’s high schools

America’s greatest educational shortcoming today is what for much of our history was its greatest pride: our public schools. American schools have long been the cornerstone of this country’s fundamental belief that all people have equal value and deserve an equal opportunity to lead productive lives. Yet all of the evidence indicates that our high schools are no longer a path to opportunity and success, but a barrier to both.

Our current expectations for what our students should learn in school were set fifty years ago to meet the needs of an economy based on manufacturing and agriculture. We now have an economy based on knowledge and technology. Despite the best efforts of many committed educators and administrators, our high schools have simply failed to adapt to this change. As any parent knows, however, our children have not – they are fully immersed in digital culture.

As a result, while most students enter high school wanting to succeed, too many end up bored, unchallenged and disengaged from the high school curriculum – “digital natives” caught up in an industrial-age learning model. Many high school students today either drop out or simply try to get by. For those who graduate, many lack the skills they need to attend college or to find a job that can support a family. Until we transform the American high school for the 21st century, we will continue limiting the lives of millions of Americans each year. The cost of inaction substantially increases each year that we fail to act. Consider the following facts:

America has one of the lowest high school graduation rates in the industrialized world. According to a study released by *Education Week*, three out of every 10 ninth-grade students will not graduate on time and about half of all African American and Hispanic ninth graders will not earn a diploma in four years. Of those who do graduate and continue on to college, over a quarter have to take remedial courses on material they should have learned in high school. Employers complain that high school graduates today lack the basic writing and analytic skills required to succeed even in entry level positions.

Every student in America should graduate from high school ready for college, career and life. Every child. No exceptions. Whether they are going off to college or into the work force or a combination of the two, it is the responsibility of public education to give our young people the skills, knowledge and preparation for life they need and deserve.

As we work toward this goal, I would urge Congress to place an equal focus on standards, measurements and data, and additional support for students and teachers. Educational standards have one central purpose – to ensure that students make the most of their abilities. For our country and our young people to be successful, all students

should have access to schools and courses that prepare them for college, career and life. Many state standards in place today are unacceptably low.

For instance, only about half of our states require students to take three or four years of math to graduate from high school. Eight states do not set any math course requirements. Furthermore, in many states, *any* math course counts toward that requirement, as if consumer math were the same as calculus. If high standards encourage young people to make the most of their talents, then low standards discourage them from doing so – and right now, that is our predominant policy. I applaud the commitments made by more than 30 governors to raise their states’ math and literacy standards and ensure K-12 policies help students meet the demands of college and work. I commend the President and Secretary of Education for their call for rigorous coursework and the members of this Committee for their tireless attention to these issues. We need to continue to support these efforts by offering incentives for states to adopt higher standards.

We also must understand how well our schools and students are performing relative to these standards. Data collection systems must be transparent and accurate so that we can understand what is working and what isn’t and for whom. Therefore, we need data by race and income. I urge this Committee to support the creation of a Center for State Education Data, which will serve as a national resource for state education data and will provide one-stop access for education research and policymakers, along with a public website to streamline education data reporting. But we can’t just collect data. We also need to use the data we collect to implement change, including by personalizing learning to make it more relevant and engaging for students – and thereby truly ensure that no child is left behind.

We also need to accurately define and measure graduation rates. Currently, states use a variety of different methods for calculating graduation rates. There is no universally accepted standard that would allow easy comparisons between states or school districts. Recently, the governors of all fifty states took a big step to correct this problem by signing the National Governors Association's Graduation Rate Compact, which commits them to adopt accurate and consistent measurements. Federal policies should provide incentives for states to meet this important goal.

If we are going to demand more from our students and teachers, then it is our obligation to provide them with the support they need to meet the challenge. All students – regardless of age, grade level, gender, or race – do better when they are supported by a good teacher. Committed, quality teachers are the lynchpin of a good educational system, and those that excel – especially in challenging schools or in high-need subjects like math and science – should be rewarded. The Teacher Incentive Fund is an important first step in ensuring that teachers are rewarded, valued and respected as they would be in my company or in any other organization. This program should be made permanent through authorization.

We also need to take steps to ensure that curricula are engaging and relevant to students’ current needs. A model for this is the Partnership for 21st Century Skills, of which

Microsoft is a member. This unique partnership of education, government, and business leaders seeks to help schools adapt their curricula and classroom environments to align more closely with the skills that students need to succeed in the 21st century economy, such as communication and problem-solving skills.

Finally, we must also ensure that our struggling students have more opportunities for in-depth learning and personal attention. This means more quality learning time in schools, access to high-quality learning materials, after school enrichment programs, and tutors.

Making these changes will be hard, but not impossible. This committee has done important work in this regard through the No Child Left Behind legislation. The reauthorization of No Child Left Behind offers Congress an opportunity to build on this work and address the other critical issues I have highlighted. I know these changes are possible in part through my work with the Gates Foundation, which has invested over \$1.5 billion in partnership with non-profits, school districts, states, the private sector and others, to improve high school education, including the support of more than 1800 high-quality high schools in 40 states and the District of Columbia. Microsoft has likewise made deep investments in education, especially through our Partners in Learning program. That program creates partnerships to provide resources to educators focused on leadership development and holistic learning reform. One of the program's flagship initiatives has been our collaboration with the School District of Philadelphia to build a "School of the Future" – bringing innovation to all areas of high school redesign, including instruction, technology integration, hiring and professional development, and building design.

I would like to mention three other initiatives in particular that demonstrate what can be achieved:

- **New York City** has opened close to 200 new schools in the last five years with many replacing some of the city's most underperforming schools. The first set of new schools achieved an average 79 percent graduation rate compared to graduation rates ranging from 31 to 51 percent at the schools they replaced.
- **Boston's** business, education and civic leaders have made a commitment to dramatically increase the number of young people ready for college and career. A winner of the Broad Prize this year, Boston has increased math scores on the 4<sup>th</sup> and 8<sup>th</sup> grade National Assessment of Educational Progress at a faster rate than other large American cities participating in NAEP's Trial Urban District Assessment. The number of AP math and English exams taken by minority students is up more than 200 percent for Latino students and 78 percent for African Americans since 2002.
- **Early College High Schools** are perhaps the most innovative and groundbreaking initiative underway nationally and show all of us what we can do if we think differently. The early college model is counter-intuitive to most, at least initially. The approach is to recruit traditionally low-performing, struggling students to attend high schools that require enrollment in college courses. The schools provide the corresponding support and guidance for students to

graduate with two years of college credit and/or an associate's degree. Today, there are more than 125 early college high schools in operation in over 20 states, and there are plans to open up to 45 more by 2008. So far, among the first class of ninth graders at the original three Early College high schools, over 95 percent graduated with a high school diploma, over 57 percent have earned an associate's degree, and over 80 percent have been accepted into four-year colleges.

I encourage all of you to visit any of these school models or districts and see this innovation first hand.

These pockets of success are exciting. But they alone cannot transform our education systems. Doing that will take political and public will. When people learn about the problems with our high schools, and they hear about the possibility of success, they demand change. That is why the Gates Foundation has joined with the Broad Foundation to support the **Strong American Schools Partnership**. This Partnership, which will be formally launched later this month, is intended to express America's shared vision that we need to demand more for our children now so that they will be more prepared and more successful as adults.

#### B. Promoting math and science education

Another area where America is falling behind is in math and science education. We cannot possibly sustain an economy founded on technology pre-eminence without a citizenry educated in core technology disciplines such as mathematics, computer science, engineering, and the physical sciences. The economy's need for workers trained in these fields is massive and growing. The U.S. Department of Labor has projected that, in the decade ending in 2014, there will be over two million job openings in the United States in these fields. Yet in 2004, just 11 percent of all higher education degrees awarded in the U.S. were in engineering, mathematics, and the physical sciences – a decline of about a third since 1960.

Recent declines are particularly pronounced in computer science. The percentage of college freshmen planning to major in computer science dropped by 70 percent between 2000 and 2005.<sup>3</sup> In an economy in which computing has become central to innovation in nearly every sector, this decline poses a serious threat to American competitiveness. Indeed, it would not be an exaggeration to say that every significant technological innovation of the 21st century will require new software to make it happen.

The problem begins in high school. International tests have found our fourth graders among the top students in the world in science and above average in math. By eighth grade, they have moved closer to the middle of the pack. By 12<sup>th</sup> grade, U.S. students score near the bottom of all industrialized nations. Too many students enter college without the basics needed to major in science and engineering. Part of our effort to

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<sup>3</sup> Jay Vegso, *Drop in CS Bachelor's Degree Production*, Computing Research News, March 2006, available at: <http://www.cra.org/CRN/articles/march06/vegso.html>.

transform the American high school for the 21st Century must focus on reversing this trend and improving education in math and sciences.

I believe our schools can do better. High schools are emerging around the country that focus on math and science, and they are successfully engaging students who have long been underrepresented in these fields – schools like the School of Science and Technology in Denver, Aviation High School in Seattle, and University High School in Hartford, Connecticut. These schools have augmented traditional teaching methods with new technologies and a rigorous, project-centered curriculum, and their students know they are expected to go on to college. This combination is working to draw more young people, especially more African American and Hispanic young people, to study math and science.

Schools are also partnering with the private sector to strengthen secondary school math and science education, and I want to mention one recent initiative in particular with which Microsoft has been involved. It is called the Microsoft Math Partnership, and it is a public-private initiative designed to focus new attention on improving middle-school math education. Although the program is currently focused on schools in Washington State, we believe this Partnership provides a sound model for public-private sector efforts across America.

To remain competitive in the global economy, we must build on the success of these schools and initiatives and commit to an ambitious national agenda for high school education. But we also must focus on post-secondary education. College and graduate students are simply not obtaining science, technology, engineering, and mathematics (“STEM”) degrees in sufficient numbers to meet demand. The number of undergraduate engineering degrees awarded in the United States fell by about 17 percent between 1985 and 2004.

This decline is particularly alarming when we look at educational trends in other countries. In other countries, a much greater percentage of college degrees are in engineering than in the U.S.<sup>4</sup> If current trends continue, a significant percentage of all scientists and engineers in the world will be working outside of the U.S. by 2010.<sup>5</sup>

For years, the decline in the percentage of graduate degrees awarded to American students in science, technology, engineering, and math was offset by an increase in the percentage of foreign students obtaining these degrees.<sup>6</sup> But new security regulations and our obsolete immigration system – which I will address in a moment – are dissuading foreign students from studying in the United States. Consider this: applications to U.S.

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<sup>4</sup> National Science Foundation, <http://www.nsf.gov/statistics/seind06/append/c2/at02-38.xls> .

<sup>5</sup> Hannah Beech, *Asia's Great Science Experiment*, Time Magazine, October 23, 2006, available at: <http://www.time.com/time/magazine/article/0,9171,1549364,00.html>.

<sup>6</sup> A recent study concluded that roughly 43 percent of computer science and engineering degree recipients are non-resident aliens. See Kessler, *supra* note 4.

graduate schools from China and India have declined and fewer students are taking the Graduate Record Exam required for most applicants to U.S. graduate schools.<sup>7</sup> The message here is clear: We can no longer rely on foreign students to ensure that America has enough scientists and engineers to satisfy the demands of an expanding economy.

Tackling this problem will require determination by government and support by industry. The goal should be to “[d]ouble the number of science, technology, and mathematics graduates by 2015.”<sup>8</sup> Achieving this goal will require both funds and innovative ideas. For high schools, we should aim to recruit 10,000 new science and mathematics teachers annually and strengthen the skills of existing teachers. To expand enrollment in post-secondary math and science programs, we should provide 25,000 new four-year, competitive undergraduate scholarships each year to U.S. citizens attending U.S. institutions and fund 5000 new graduate fellowships each year. America’s young people must come to see STEM degrees as opening a window to opportunity. If we fail at this, we simply will be unable to compete with the emerging innovative powerhouses abroad.

### C. Greater opportunities for job training

Even as we work to improve educational opportunities in our school systems and universities, we cannot lose sight of the need to constantly upgrade and enhance the skills and expertise of those people already in our workforce. Securing America’s global competitiveness requires not only a highly educated pool of innovators, but also a workforce that is equipped with the skills necessary to use technology effectively. In today’s economy, that means a high degree of basic literacy, an increasing level of computing skills, and the ability to create, analyze and communicate knowledge.

Over the next several years, 6 out of every 10 new jobs will be in professional and service-related occupations.<sup>9</sup> Given the state of our educational system, it is not surprising that U.S. companies are reporting serious shortages of skilled workers.<sup>10</sup> According to a 2005 U.S. Department of Education study, only 13 percent of American adults are proficient in the knowledge and skills needed to search, comprehend and use information, or to perform computational tasks.<sup>11</sup> This yawning gap between America’s

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<sup>7</sup> *Id.*

<sup>8</sup> The Business Roundtable, *Tapping America’s Potential: The Education for Innovation Initiative*, July 2005, <http://www.businessroundtable.org/pdf/20050727002TAPStatement.pdf>.

<sup>9</sup> Daniel Hecker, *Occupational Employment Projections to 2014*, Monthly Labor Review, November 2005, at 70, 71, <http://www.bls.gov/opub/mlr/2005/11/art5full.pdf>.

<sup>10</sup> See, e.g., Phyllis Eisen, et al., *2005 Skills Gap Report – A Survey of the American Manufacturing Workforce*, December 2005, [http://www.nam.org/s\\_nam/bin.asp?CID=202426&DID=235731&DOC=FILE.PDF](http://www.nam.org/s_nam/bin.asp?CID=202426&DID=235731&DOC=FILE.PDF).

<sup>11</sup> National Center for Education Statistics, U.S. Department of Education, *National Assessment of Adult Literacy: A First Look at the Literacy of America’s Adults in the 21<sup>st</sup> Century*, December 2005, at 4, <http://nces.ed.gov/NAAL/PDF/2006470.PDF>.

economic needs and the skills of its workforce indicates that as a nation we are not doing nearly enough to equip and continuously improve the capabilities of American workers.

Part of this task must fall to the private sector. For its part, Microsoft over the past decade has launched a range of both commercial and philanthropic programs aimed at providing IT skills training to U.S. workers. Our commercial offerings include the Microsoft Learning program, which provides IT skills training and certification in cooperation with hundreds of commercial partners, and the Microsoft IT Academy, which provides online IT training programs and other resources to accredited educational institutions across the United States.

But several years ago, we decided to focus our community outreach programs to support training in basic computing and Internet skills—a program we call Unlimited Potential. Through this program, we provide the curriculum, software and grants to support digital skills training in community learning centers run by government and non-government agencies throughout the country and around the world. For example, last year, Microsoft partnered with the U.S. Department of Labor to provide \$3.5 million in cash and software to twenty of the Department’s One-Stop Career Centers located throughout the country. We also donated our innovative Digital Literacy curriculum to those Centers to advance their technology training mission. We have similar partnerships with the Boys and Girls Clubs, the National Urban League and with many development agencies and NGOs in more than 100 countries.

In combination with our parallel program for school-based training, Partners in Learning, our ambition is to reach a quarter of a billion people by the end of this decade. Meanwhile, we have begun reaching out to other companies, industry associations and state agencies to build a workforce alliance that will promote the digital skills needed to compete in a wide range of industry and service sectors.

As a nation, our goal should be to ensure that, by 2010, every job seeker, every displaced worker, and every individual in the U.S. workforce has access to the education and training they need to succeed in the knowledge economy. This means embracing the concept of “lifelong learning” as part of the normal career path of American workers, so that they can use new technologies and meet new challenges. Neither industry nor government can achieve these goals if we act alone. Federal, state, and local governments must help to prepare all of our workers for the jobs required in a knowledge economy. Workforce enhancement should be treated as a matter of national competitive survival. It is a down-payment on our future, an extremely vital step to secure American competitiveness for future generations and to honor the American ideal that every single one of us deserves the opportunity to participate in America’s success.

## **II. Attracting and Retaining the World’s Best and Brightest**

For generations, America has prospered largely by attracting the world’s best and brightest to study, live and work in the United States. Our success at attracting the

greatest talent has helped us become a global innovation leader, enriched our culture, and created economic opportunities for all Americans.

Unfortunately, America's immigration policies are driving away the world's best and brightest precisely when we need them most. I appreciate the vital national security goals that motivate many of these policies. I am convinced, however, that we can protect our national security in ways that do less damage to our competitiveness and prosperity. Moreover, the terrible shortfall in our visa supply for the highly skilled stems not from security concerns, but from visa policies that have not been updated in over a decade and a half. We live in a different economy now. Simply put: It makes no sense to tell well-trained, highly skilled individuals – many of whom are educated at our top colleges and universities – that the United States does not welcome or value them. For too many foreign students and professionals, however, our immigration policies send precisely this message.

This should be deeply troubling to us, both in human terms and in terms of our own economic self-interest. America will find it infinitely more difficult to maintain its technological leadership if it shuts out the very people who are most able to help us compete. Other nations are recognizing and benefiting from this situation. They are crafting their immigration policies to attract highly talented students and professionals who would otherwise study, live, and work here. Our lost opportunities are their gains.

I personally witness the ill effects of these policies on an almost daily basis at Microsoft. Under the current system, the number of H1-B visas available runs out faster and faster each year. The current base cap of 65,000 is arbitrarily set and bears no relation to U.S. industry's demand for skilled professionals. For Fiscal Year 2007, the supply did not last even eight weeks into the filing period, and ran out more than four months before that fiscal year even began.

For Fiscal Year 2008, H-1Bs are expected to run out next month, the first month that it is possible to apply for them. This means that no new H-1B visas – often the only visa category available to recruit critically needed professional workers – will be available for a nearly 18-month period. Moreover, this year, for the first time in the history of the program, the supply will run out before the year's graduating students get their degrees. This means that U.S. employers will not be able to get H-1B visas for an entire crop of U.S. graduates. We are essentially asking top talent to leave the U.S.

As with H-1B visas, the demand for green cards far exceeds the supply. Today, only 140,000 permanent employment-based visas are available each year, which must cover both key employees and their family members. There is a massive backlog in many of the employment-based green card categories, and wait times routinely reach five years. Ironically, waiting periods are even longer for nationals of India and China – the very countries that are key recruiting grounds for the professionals desperately needed in many innovative fields.

In the past, we have succeeded in attracting the world’s best and brightest to study and work in the United States, and we can and must do it again. We must move beyond the debate about numbers, quotas, and caps. Rather, I urge Congress to ask, “How do we create a system that supports and sustains the innovation that drives American growth, economic opportunity and prosperity?” Congress can answer that question by acting immediately in two significant ways.

First, we need to encourage the best students from abroad to enroll in our colleges and universities, and to remain in the United States when their studies are completed. Today, we take exactly the opposite approach. Foreign students who apply for a student visa to the United States today must prove that they *do not* intend to remain here once they receive their degrees. This makes no sense. If we are going to invest in educating foreign students – which we should and must continue to do – why drive them away just when this investment starts to pay off for the American economy?

Barring high-skilled immigrants from entry to the U.S., and forcing the ones that are here to leave because they cannot obtain a visa, ultimately forces U.S. employers to shift development work and other critical projects offshore. This can also force U.S. companies to fill related management, design, and business positions with foreign workers, thereby causing further lost U.S. job opportunities even in areas where America is strong, allowing other countries to “bootstrap” themselves into these areas, and further weakening our global competitive strength. If we can retain these research projects in the United States, by contrast, we can stimulate domestic job and economic growth. In short, where innovation and innovators go, jobs are soon to follow.

Second, Congress should expedite the path to Permanent Resident status for highly skilled workers. The reality for Microsoft and many other U.S. employers is that the H1-B visa program is temporary only in the sense that it is the visa we use while working assiduously to make our H1-B hires – whether educated in the U.S. or abroad – permanent U.S. residents. Rather than pretend that we want these highly skilled, well trained innovators to remain for only a temporary period, we should accept and indeed embrace the fact that we want them to become permanent U.S. residents so that they can drive innovation and economic growth alongside America’s native born talent.

These reforms do not pit U.S. workers against those foreign born. They do not seek to make or perpetuate distinctions among the best and brightest on the basis of national origin. They simply recognize the fact that America’s need for highly skilled workers has never been greater, and that broad-based prosperity in America depends on having enough such workers to satisfy our demand. Far from displacing U.S. workers, highly skilled foreign-born workers will continue to function as they always have: as net job creators.

### **III. Investing in Research, Rewarding Innovation**

#### **A. Investments in research and development**

America's current technology leadership is a direct result of investments that previous generations made in basic scientific research, especially publicly funded projects undertaken in government and university research labs. For instance, research in the 1970s by the Defense Department's Advanced Research Projects Agency (ARPA, later known as DARPA) led directly to many of the technologies that underlie today's Internet. As another example, grants from the U.S. Navy and the National Science Foundation helped fund the development of public key encryption systems, which we now use daily in everything from ATM machines to email and electronic commerce.

American companies were able to capitalize on these innovations and turn them into globally successful products because of our world-class universities, innovative policies on technology transfer, and pro-investment tax rules. These policies have driven a surge in private-sector R&D investment. Since the mid-1970s, U.S. industry investment in R&D has more than quadrupled. Today, industry is responsible for two-thirds of total R&D in the United States, and as of the early part of this decade, industry R&D investments were growing faster than the economy as a whole. Microsoft in many ways exemplifies this trend. We annually invest over \$6 billion in R&D, which ranks among the highest R&D expenditures in the world by a major technology provider, both in absolute terms and as a percentage of revenues.

As important as private-sector R&D investment is, federal research funding is equally vital to America's technology leadership. Federally funded research enriches the commons of knowledge and provides the raw material for U.S. industry to transform into commercially successful products. Federal funding for university-based R&D also helps educate the next generation of scientists and engineers – those who will largely determine whether America remains innovative and globally competitive.

In my view, America's ability to remain a technological powerhouse will depend in large part on the extent to which the Federal Government invests in basic research. Unfortunately, federal research spending is not keeping pace with our nation's needs. According to the Task Force on the Future of American Innovation, “[a]s a share of GDP, the U.S. federal investment in both physical sciences and engineering research has dropped by half since 1970. In inflation-adjusted dollars, federal funding for physical sciences research has been flat for two decades . . . .”<sup>12</sup> This stagnation in spending comes at a time when other countries and regions, such as China and the EU, are increasing their public investments in R&D.

To ensure that our federal and university research labs continue to serve as sources of innovation and expertly trained scientists, and that industry has incentives to continue investing heavily in R&D, it is critical that Congress take the following steps:

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<sup>12</sup> Task Force on the Future of American Innovation, *Measuring the Moment: Innovation, National Security, and Economic Competitiveness*, November 2006, at 9, <http://futureofinnovation.org/2006report/> (follow “Benchmarks of Our Innovation Future” report hyperlink).

First, the Federal Government needs to increase funding for basic scientific research significantly. While recent increases in the research budgets of the Department of Energy and the National Science Foundation are commendable, more must be done. As Federal research priorities expand into new areas, we should seek to increase funding for basic research by 10 percent annually over the next seven years. Congress should consider other innovative ideas as well, such as: (1) new research grants of \$500,000 each annually to 200 of the most outstanding early-career researchers; (2) a new National Coordination Office for Research Infrastructure to manage a centralized research-infrastructure fund of \$500 million per year; (3) establishing and providing funding for Advanced Research Projects Agencies in various departments, similar to DARPA of the 1970s; and (4) ensuring that research projects are communicated to the private sector so that companies can collaborate more effectively with recipients of public research funds.

Second, Congress should permanently extend the R&D tax credit, which expires again at the end of the 2007. Each year, Microsoft creates thousands of new R&D jobs throughout the world. As we continue to look for opportunities to reduce costs across our business, the R&D tax credit provides an important incentive to encourage Microsoft and other U.S. companies to continue to increase R&D investment in the United States. The credit is a positive stimulus to U.S. investment, innovation, wage growth, consumption, and exports, all contributing to a stronger economy and a higher standard of living. As other countries recognize the long-term value of R&D and offer permanent and generous incentives to attract R&D projects, the United States must renew its commitment to U.S.-based R&D by making the tax credit permanent so businesses may rely on it when making decisions on where to source R&D projects.

B. Rewarding innovation

In addition to investing in innovation, we must also reward innovators. This means giving inventors the ability to obtain intellectual property protection for their innovations, and to enforce these rights in the marketplace. America is fortunate that our leaders recognize the importance of intellectual property rights and the need for these rights to be respected, both at home and abroad. I know I join many other Americans in thanking this Congress and this Administration for their tireless efforts to promote intellectual property protection.

In this regard, I would briefly note Microsoft's support for current efforts in Congress to reform the U.S. patent system to meet the needs of the 21st century. Microsoft and other technology companies are working closely with Chairman Leahy and Senator Hatch on the Senate Judiciary Committee, and with the leadership of the House Judiciary Committee, to advance legislation on needed reforms. Although I will not delve into the details here, the reforms supported by Microsoft and many others will improve patent quality, reduce excessive litigation, and promote international patent harmonization – reforms that are vital if America is to retain its pre-eminence in technology innovation.

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In my view, the challenges confronting America's global competitiveness and technological leadership are among the greatest we have faced in our lifetime. Frankly, we have not been the careful stewards of our own "innovation account" that our children and grandchildren have a right to expect of us. It is time to revisit our game plan in this regard.

I recognize that implementing these solutions will not be easy and will take strong political will and courageous leadership. But I firmly believe that our efforts, if we succeed, will pay rich dividends for our nation's next generation. We have had the amazing good fortune to live through one of the most prosperous and innovative periods in history. We must not squander this opportunity to secure America's continued competitiveness and prosperity.

Thank you again for this opportunity to testify. I welcome your questions on these topics.